Pile Fires: A Discussion Paper

Photos will be added.

Photo 1
Photo 2

"Where there is smoke, there is ire."

Draft of December 10, 2004

Preface

This Discussion Paper was prepared to promote discussion on the topic of fires in piles of material at solid waste facilities. The identified interested parties are CIWMB staff, LEAs, operators, firefighters, other governmental agencies and neighbors. Detailed fire incident histories have not normally been prepared for fire in small piles of:

1) compost related materials,
2) construction and demolition debris, and
3) other waste types.

This document is based upon inspection report information entered into CIWMB's SWIS database as well as news reports and personal communications from LEAs, Board staff and others.

While the information presented herein is believed to be correct, additional peer review may result in revisions and updates.

Anyone wishing to receive the latest version of this Discussion Paper or provide suggested revision or updates is requested to contact:

Dennis Corcoran, M. Sc.
Local Enforcement Agency Training Program
Permitting and Enforcement Division
CIWMB, Cal/EPA
Mail Stop 17
1001 I Street
PO Box 4025
Sacramento, CA 95812 - 4025
Phone: 916.341.6395
E-mail: dcorcora@ciwmb.ca.gov

Add Photo 3

1.0

Introduction

Twelve (12) fires are profiled in this discussion paper to provide an overview of the various types of solid waste fires that have occurred recently. These case studies can serve as focal points for further discussion on the issue. Seven (7) fires involved composting, one (1) involved self-haul waste at a transfer station, one (1) was Alternative Daily Cover (ADC) at a landfill, and three (3) were Construction and Demolition Debris feedstock (aka C+D).

A search of inspection reports in the Solid Waste Information System (SWIS) found that the subject of "fire" is present in over a thousand reports. In some cases, the report notes that a fire extinguisher was past its expiration date or employees were observed smoking in a designated "No Smoking Area". In other cases, the SWIS entry indicates more significant observations:

Δ fire observed in landfill working face by inspector upon arrival,
Δ fire observed in composting feedstock by inspector upon arrival,
Δ evidence of fire observed by inspector but no entry in Special Occurrence Log,
Δ designated fire lanes obstructed by waste material or product,
Δ piles of waste are too big and too tall, and
Δ feedstock piles reside on-site too long without processing,

In most of these cases, a large fire does not occur. However, the Crippen Fire in Fresno County at an unpermitted C+D facility and the Vasco Road Fire at a permitted landfill near Livermore in Alameda County are two examples of solid waste fires that have received extensive news coverage regarding the potential for significant impacts including human health risks for inhalation of air pollutants including Particulate Matter (PM).

On January 11, 2003, a fire started in wood and other waste material in Northwestern Fresno County at the Archie Crippen site. The debris pile was estimated to be 40 feet tall and amounted to 100,000 cubic yards. It burned for 4 weeks, and cost $6 million dollars to extinguish and then clean up the site.

(For more information, see: http://www.bsa.ca.gov/bsa/pdfs/2003-113.pdf for a copy of Bureau of State Audits report which discusses this fire.)

On April 2, 2004, a fire was detected in a material stored at Vasco Road Landfill near Interstate 580 in Alameda County near Livermore, CA. The fire occurred in a pile of "auto shredder fluff" which was being stored for subsequent use as Alternatively Daily Cover. ("Auto shredder fluff" is sliced, diced, minced and shredded material from the passenger compartments of cars and trucks including the seats, dashboards, and liners.) This pile was about 200 by 200 feet square and 30 feet deep. The fire was first observed at 6:30 am and was extinguished by 1:30 pm on the same day. During the fire incident, smoke drifted off-site toward the City of Livermore. A "shelter-in-place-order" was

issued by responders at the scene. However, no official reports documenting occupational or public injury or illness have been received by CIWMB.

Other solid waste fires have occurred including pile fires of waste material at a transfer station, at composting operations, as well as in piles of construction and demolition materials. These twelve (12) fires are profiled in Section 2.0.

AB 939 mandates that communities reduce their waste going to landfills by 50% by the year 2000. Many communities have achieved this goal by diverting compostable material from their landfills and recycling construction and demolition debris; other jurisdictions are close to meeting this legal mandate but are still pursuing this goal. Fulfilling the AB 939 goal of 50 % reduction and pursuing the new goal of Zero Waste requires the siting of various sold waste facilities through the state that are preferably near the source of waste generation. Concern has been expressed that fires at solid waste facilities, with the resultant smoke, emergency service traffic, and air emissions make it more difficult to site these solid waste facilities and more difficult for these diversion facilities to operate, and be expanded. These difficulties with diversion facilities can make it more difficult for local jurisdictions to meet the statutorily mandated AB 939 diversion goals.

The problem of fires in composting operations is mentioned in the trade literature. On the issue of compost related fires, Rynk wrote:

> "Ask a group of facility operators if they have had to deal with a fire, and the majority will quietly admit they have….
>
> Generally, operators are recognizing and containing fires without a great deal of damage and publicity….
>
> Nevertheless, a fire is a serious matter. A minor one threatens to attract public inquiry about the risks and nuisances of composting activities at a particular site and within the composting industry generally. A major fire threatens a multimillion dollar investment and presents a potential danger to workers and firefighters…. This is not an issue to hide under the curing pile." (Biocycle)

This issue paper:

- Δ summarizes information on pile fires using selected case studies in Section 2,
- Δ discusses combustion processes in Section 3,
- Δ describes the governmental agencies with authority to investigate fires and/or regulate these businesses in Section 4,
- Δ reviews the barriers and gaps to better fire management in Section 5, and
- Δ discusses potential options to reduce future pile fires in Section 6.

Insert Photo

1.1 Scope of Discusssion Paper

This Discussion Paper focuses on fires in solid waste materials subject to regulation by CIWMB's Permitting and Enforcement Division and its designated Local Enforcement Agencies (LEAs). Table 1 lists selected solid waste pile fires that have occurred at:

△ transfer stations,

△ composting facilities,

△ construction and demolition debris facilities, and

△ landfills

This paper does not focus on material regulated by other regulatory programs such as tires or the recycling of metals and plastics. While it seems counterintuitive, metal recycling facilities have burned. Theses fires are attributed to the gasoline from automotive vehicles. Since these metal recycling facilities are beyond the authority of CIWMB and its solid waste LEAs, they are therefore excluded from detailed review in this Issue Paper.

Insert
Photo or Image

2.0 Case Studies

In order to provide an overview of the various pile fires, each of these twelve (12) fires has been reviewed in case study format using information in the LEA and Board inspection reports, fire department reports and other available information sources.

Seven (7) fires are listed as directly related to composting. From the data, it is not always clear which phase or phases of the composting process were involved in each fire. But, as a generalization, fire have occurred and burned feedstock, composting product, finished product as well as sorted "overs" - that is wood or plant material too large or otherwise not able to meet product specifications.

Three (3) fires directly involve Construction and Demolition Debris. The fire department incident report for one of these fires noted that the piles of self-haul C and D material provided the "optimum" conditions for a fire due to a stacking pattern with openings for oxygen. One (1) fire was in a pile of auto shredder fluff that was stored at a landfill for subsequent use as alternative daily cover. Another file was in the self-haul area at a transfer station. The material that burned was composed of the "trash" disposed by citizens who empty out their garages. The actual cause of this fire is unknown, while "spontaneous combustion" is the presumptive cause for the other case studies and in most pile fires.

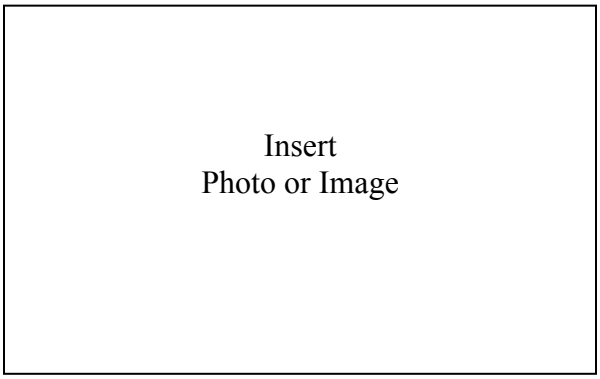

Table 1. Selected Pile Fires					
	Facility Name	**Material Burnt**	**Location**	**Date Reported**	**SWIS Number**
1	Davis Street TS	Self Haul Materials	San Leandro Alameda County	9/08/2004	01AA0007
2	Vasco Road Landfill	Auto Shredder Fluff stored for ADC	Alameda County near Livermore	4/02/2004	01AA0010
3	Crippen	Wood, construction and demolition debris	City of Fresno Fresno County	1/11/2003	10CR0075
4	Kochergen Farms	Compost Materials	Kings County near Avenal	8/15/2004	16AA0022
5	California Biomass	Compost Materials	Thermal Riverside County	10/01/2002	33AA0259
6	Coachella Valley Landfill Composting	Compost Materials	Riverside County near Indio	8/17/2004	33AA0292
7	Florin Perkins Landfill	Wood, Construction and Demolition Debris	Sacramento County	2/02/2002	34AA0180 34AA0183 34AA0206
8	Greenwaste Recovery	Smoldering pile without flame	City of San Jose Santa Clara County	4/26/2004	43AN0019
9	Shoreline Organics	Compost Materials	Oxnard Ventura County	8/30/2004	56AA0138
10	Yuba-Sutter Disposal	Construction and Demolition Debris	Yuba County near Marysville	6/23/2004	58AA005
11	Yuba-Sutter Disposal	Compost	Yuba County near Marysville	7/19/2004	58AA008
12	Yuba-Sutter Disposal	Compost Feedstock Grass and Yard Trimmings	Yuba County near Marysville	9/25/04	58AA005

Notes: Compost Material includes feedstock, composting material, finished product and culled material. The fire incident reports are not detailed enough to specify the components which caught fire and which components burned after the original ignition.

34AA0180 Inert Landfill
34AA0183 MRF and TS
34AA0206 Chip and Grind

http://www.worldofweb.com/fire/PressRelease.cfm?PressReleaseID=117
http://www.cityofsacramento.org/fire/gfx/LandFillFire020302/index.htm

Fire Pile Case Study: Davis Street Transfer Station

Name of Facility: Davis Street Transfer Station

SWIS Number: 01-AA-0007

Type of Facility: Transfer Station

Location: 2615 Davis Street, San Leandro, CA 94577

Owner: Waste Management

Operator: Waste Management

Date(s) of Fire: 09/08/2004 From 3 pm to 5:30 pm

Type of Material Burned: Material deposited in self-haul area. See photos.

Size of Fire (area or volume): Unknown.

Fire Department(s): Alameda County Fire Department

LEA: Roel Meregillano, Alameda Department of Environmental Health

Other Agencies: Bay Area Air Quality Management District
(Linda Carey, 415.771.6000)

What happened?

According to the operator's incident report, a dozer operator was pushing material at the center of waste in the public disposal area (aka self-haul area) and flames shot up around the blade of the dozer. Facility management was notified and determined that the fire was too large for site personnel to extinguish and 911 was called. The Alameda County Fire Department responded with 3 engines and extinguished the fire with the assistance of facility staff. (See letter dated September 9, 2004 from Alisha McCutcheon, Compliance Manager, Davis Street Transfer Station.)

Agency involvement?

What worked?

What was lacking?

What fixes have been adopted?

What recommended changes remain to be adopted?

Fire Pile Case Study: Vasco Road Landfill

Name of Facility: Vasco Road Landfill

SWIS Number: 01-AA-0010

Type of Facility: Landfill

Location: 4001 North Vasco Road, Livermore, CA 94550

Owner: Republic Services, Inc.

Operator: Republic Services, Inc.

Date(s) of Fire: 04/02/04 From 6:30 am to 1:30 pm

Type of Material Burned: Auto shredder fluff (materials for vehicle passenger compartments)

Size of Fire (area or volume): Pile estimated at 200 feet by 200 feet by 30 feet

Fire Department(s):	Alameda County Fire Department as well as: Livermore/Pleasanton Fire Department Lawrence Livermore Laboratory Fire Department
LEA:	Alameda County Environmental Health Department
Other Agencies:	Bay Area Air Quality Management District Bay Area Regional Quality Control Board Alameda County Haz Mat

What happened?
Landfill employee saw flame in pile and notified management who called 911.
Fire Departments responded and established a perimeter to contain fire and prevent offsite spreading due to high winds. Landfill employees used facility heavy equipment to smother fire with dirt.

Agency involvement?
What worked?

What was lacking?
What fixes have been adopted?
What recommended changes remain to be adopted?

Fire Pile Case Study: Crippen Fire

Name of Facility: Crippen Fire (aka Archie Crippen Excavation)

SWIS Number: 10-CR-0075

Type of Facility: At time of fire, it was an unpermitted solid waste facility. It is now classified as a cleaned and closed site.

Location: 3230 West Nielsen Avenue, Fresno, CA 93706

Owner: Archie Crippen

Operator: Archie Crippen

Date(s) of Fire: Started 01/11/2003 and burned for ~4 weeks.

Type of Material Burned: construction and demolition debris

Size of Fire (area or volume): Piles were estimated to be ~ 40 feet tall, totaled ~100,000 cubic yards and were located on 5 continuous acres.

Fire Department(s): Fresno City Fire Department, Fresno County Fire Department

LEA: Department of Community Health
1221 Fulton Mall, Brix Bldg
PO Box 11867
Fresno, CA 93775

Other Agencies: Fresno County, Fresno City, CIWMB

What happened? Agency involvement?

In November 1980 the county approved a conditional use permit allowing concrete and asphalt processing at the 20 acre Crippen Site. In 1983, when annexing land that included this site, the city of Fresno accepted the conditional use permit's terms without modification. In 1994 the city of Fresno issued a revised conditional use permit that allowed this site to expand onto additional property. In January 2003 at the time of the fire, CIWMB's existing regulations for Construction and Demolition facilities had not yet been adopted. The first phase of these regulations pertaining to the transfer and processing did not become effective until August 2003 and the second phase regulating disposal became effective in January 2004.

What worked?
Through the combined efforts of local, state and federal emergency response agencies the fire was contained after four weeks. The fire suppression and cleanup costs were $ 6 million.

What fixes have been adopted?
After the fire CIWMB has adopted regulations that now regulate sites such as Crippen as solid waste facilities which are subject to a permit and also monthly inspections.

What was lacking? What recommended changes remain to be adopted?

For more information, see Report 2003-113 prepared by the California State Auditor

http://www.bsa.ca.gov/bsa/pdfs/2003-113.pdf

Fire Pile Case Study: Kochergen Farms

Name of Facility: Kochergen Farms Composting

SWIS Number: 10-AA-0022

Type of Facility: Green Waste Composting

Location: Kings County near Fresno County line. [Lat 36.08736; Lon. – 120.07519]
Avenal Cut Off 2 miles East, Avenal, CA 93204

Owner: Kochergen Farms

Operator: Kochergen Farms

Date(s) of Fire: Fire start estimated at 8/15/04; Fire alarm on 8/16/04 at 0:15:33;
Last fire unit left at 9:45am. Smoke continued to XXXX. CIWMB inspector visited site on XXXX and found it to be burning.

Type of Material Burned: Compost

Size of Fire (area or volume):
LEA reports 6 rows burning; each is estimated at 100 feet by 20 feet by 15 feet.
Fire Dept report for 2004 fire does not estimate size.
Fire Dept report for 2002 fire estimates ~100 tons burned.

Fire Department(s):

LEA: Kings County Health Department
330 Campus Dr
Hanford, CA 93230

Other Agencies:

What happened?

Agency involvement? CVRWQCB, AQMD

What worked?

What was lacking?

What fixes have been adopted?

What recommended changes remain to be adopted?

Fire Pile Case Study: Cal Biomass

Name of Facility: California Bio-Mass Inc. Composting Facility

SWIS Number: 33-AA-0259

Type of Facility: Composting Facility, Full Permit

Location: 89-109 Avenue 62

Owner: California Bio Mass Inc.

Operator: California Bio Mass Inc.

Date(s) of Fire: 10/01/2002 Fire observed at 3:30 pm

Type of Material Burned: Operator's report states "material from Granite Construction".

Size of Fire (area or volume): Operator's report states fire spread due to high winds.

Fire Department(s): Not specified in Operator's report

LEA: Riverside County Department of Environmental Health

Other Agencies: Not specified in Operator's report

What happened? Operator's report states:

"On October 1, 2002, a fire occurred onsite in the material received from Granite Construction. This pile is located directly south of the West Salem Hog unit by approximately 40 feet. The fire occurred at approximately 3:30 PM. The fire department was called by our office for assistance in containing the fire. Once the fire department arrived Chief Avila directed our onsite crews to the areas requiring the most attention. The fire spread to D1, E1 and E2 because of the high winds on that day. At approximately 8:30 PM the fire department turned all suppression activities over to California Biomass personnel. We manned the suppression activities with 24 hours crews consisting of 4 men each. By Noon on October 2, 2002, the smoke had been completely eliminated and plant activities resume to normal operations. The origin of the fire was caused by spontaneous combustion and this pile was broken down to minimize this threat in the future."

Agency involvement?
What worked?
What was lacking?
What fixes have been adopted?
What recommended changes remain to be adopted?

Fire Pile Case Study: Coachella Valley Composting Facility

Name of Facility: Coachella Valley Composting Facility

SWIS Number: 33-AA-0292

Type of Facility: Composting Facility Green Waste Standardized Tier

Location: SWIS lists 87011 Landfill Road, Desert Hot Springs, CA 92241
Water Board uses 87011 Landfill Road, Indio, CA 92201

Owner: County of Riverside Waste Management Department

Operator: SWIS states Salado Creek Enterprises as of 9/24/04
LEA reports new owner is Agriservices, SWIS change pending

Date(s) of Fire: Department of Forestry and Fire Protection (aka CDF) prepared a FC-18 which indicated:
Estimated start: 8/17/2004 at 00:01:00
First Alarm: 8/17/2004 at 03:05:00 (3:05 am) via 911 telephone line call
First on Scene: 8/17/2004 at 03:32:00
Contained/controlled: 8/21/2004 at 08:00:00 (8:00 am)
Notes: Fire crews found well established fire in large compost facility. No action taken by fire crews. Business owner contacted. Owner took action to suppress the fire. Fire contained to original slash. Fire controlled by 08/21/04

Type of Material Burned: Rows of ground palm material

Size of Fire (area or volume): LEA reports 8 rows

Fire Department(s): Department of Forestry and Fire Protection (aka CDF)

LEA: County of Riverside, Department of Environmental Health

Other Agencies:

What happened?

Agency involvement?
What worked?
What was lacking?
What fixes have been adopted?
What recommended changes remain to be adopted?

Fire Pile Case Study: Florin-Perkins

Names of Facilities: Florin-Perkins Landfill
Florin-Perkins MRF and TS
Florin-Perkins Chip and Grind

SWIS Number: 34AA0180 Inert Landfill
34AA0183 MRF and TS
34AA0206 Chip and Grind

Type of Facility: Inert Landfill
MRF and TS
Chip and Grind

Location: 4201 Florin Perkins Road, Sacramento, CA 95827

Owner: Nancy Cleavinger, Davis Trust

Operator: Florin-Perking Landfill, Inc.

Date(s) of Fire: 2/02/2002

Type of Material Burned:

Size of Fire (area or volume)

Fire Department(s)

LEA: Sacramento County Environmental Management Department
Environmental Health Division
8475 Jackson Rd Ste 240
Sacramento, CA 95826

Other Agencies: Air Quality Management District? RWQCB? ??

What happened?

http://www.worldofweb.com/fire/PressRelease.cfm?PressReleaseID=117

Sac City Fire arrived on scene, fought fire for two days, left smoldering piles in the hands of the operator at 4pm on 2/04/2002.

Agency involvement?

Primarily Sac City Fire Department. SMAQMD contacted LEA to get information regarding air pollution hazard of the burning material. LEA informed of fire by fax from Operator.

What worked?

Sacramento City Fire Department was aware of the site and its configuration due to response to previous small fires that had occurred on the site, either in the transfer station waste or smaller piles of wood debris. Sacramento City Fire Department had appropriate and adequate equipment available to fight fire. The fire was contained within a pit area, so the chance of the fire escaping was low. Fuel for the fire was homogenous – wood and tar paper from roof tearoff wastes. There was no mixture of concrete or other debris to interfere with the physical movement and spreading of the burning material as a fire control measure.

What was lacking?

Adequate water supply on site was lacking. Pile size was too large. There was inadequate access for fire fighting equipment to reach burning material. Another major problem was a lack of communication between the Fire Department and the LEA.

What fixes have been adopted?

Fire Department required a Fire Control Plan be submitted. A fire control water supply has been installed onsite and approved by both the City Plumbing Inspectors and City Fire Inspectors. Access roads have been improved. Pile sizes have been drastically reduced.

What recommended changes remain to be adopted?

LEA is unaware if Operator has fully complied with the enforcement order issued by City Fire Department. Better communication between City Fire and LEA is needed. LEA enforcement action is in process. LEA has determined that the site requires a Full Solid Waste Facilities Permit under the Compostable Material Handling Regulations.

Fire Pile Case Study: Greenwaste Recovery Facility

Name of Facility: Greenwaste Recovery (2 words in SWIS)

SWIS Number: 43-AN-0019

Type of Facility:

Location: 625 Charles Street, San Jose, CA 95112

Owner: Green Waste Recovery (3 words in SWIS)

Operator: Green Waste Recovery (3 words in SWIS)

Date(s) of Fire: Reported at 10:30 pm on April 26, 2004. According to LEA, facility employee found pile smoldering at 10:30 pm and called the fire department. Fire was put out by 9 am on April 27, 2004 and facility reopened.

Type of Material Burned:
Size of Fire (area or volume)
Fire Department(s)
LEA:
Other Agencies:

What happened?

Agency involvement?

What worked?

What was lacking?

What fixes have been adopted? According to the LEA, the smoldering fire, without flame, was considered to be a "fluke" and no new handling procedures were required.

What recommended changes remain to be adopted? See above.

LEA inspection report for April 27, 2004 states:
Total violation tonnage violations occurred 22 times this month.
Food waste tonnage exceeded SWFP 5X`s this month with a peak of 209 tpd.
Yardwaste exceeded SWFP tonnage 2X`s this month with peaks of 669 tpd.
This facility is a chronic violator of permit tonnage limits and will receive a notice and order.

Fire Pile Case Study: Shoreline Organics

Name of Facility: Shoreline Organics Soil Amendments and Composting

SWIS Number: 56-AA-0138

Type of Facility: Green Waste Composting (Registration Tier)

Location: 6859 Arnold Road, Oxnard, CA 93003

Owner: Finn Moller of USA Petroleum

Operator: Kris and Austin Moller

Date(s) of Fire: August 30, 2004

Type of Material Burned: According to Fire Department, a stockpile of green waste appeared to be on fire.

Size of Fire (area or volume): 100 feet by 200 feet by 15 feet. About 1,000 cubic yards of material was affected.

Fire Department(s): Oxnard Fire Department (OFD)

LEA: Ventura County Environmental Health Department

What happened?

> According to LEA, fire reported by private citizen at 3:30 AM. Burning material was very close to a greenwaste security berm. This berm appeared to catch fire as well. Inadequate space between waste and berm is a fire prevention violation. According to OFD, fire did not appear to be the result of external ignition. According to Ventura Star, firefighters spent several hours separating compost piles to keep the blaze from spreading and fire was contained at 10 AM.

Agency involvement?

> On August 31, 2004, the LEA conducted an inspection of Shoreline facility in response to reports of a compost fire that allegedly started on August 30, 2004. Based upon our observations, discussions with the operator and representatives from the Oxnard City Fire department, the LEA determined that there were several factors that contributed to the fire.

1. Shoreline's grinder had been broken down allowing for the accumulation of unchipped green waste. Approximately 2, 000 cubic yards of material were not ground and had been sitting for 7 to 10 days.

2. The material was mildly moist, most likely due to slight coastal fog or typical haze in the morning hours.

3. The raw feedstock was not well mixed, meaning there were locations of high nitrogen in the pile. More specifically, a 10 cubic yard load of manure and bedding material had been delivered on August 29th. It appeared that this manure material had been involved in the fire, but it could not be confirmed as the ignition source. Due to its porous nature, the damp feedstock pile may have allowed oxygen deeper into the pile that facilitated bacterial growth and subsequent high heat generation.

4. The feedstock ppile was close to a security berm made og green waste. This berm material caught fire. Approximately 100 cubic yards of berm material burned.

What worked?

Separation of burning material from the other feedstock dissipated the heat, and restricted the amount of fuel being consumed by the fire.

What was lacking?

Shoreline should have been grinding the incoming feedstock as soon as it came it. Alowwing unprocessed material to sit in a large pile increased the chances for ignition and fire. Also, Shoreline needed to use lane separation between the incoming feedstock and its security berm.

What fixes have been adopted?

A fire lane was added between the feedstock and security berm.

What recommended changes remain to be adopted?

1. All feed stock material should be processed and removed from the site or placed in windrows within 48 hours of receipt.

2. Operator shall revise facility fire prevention plan to include provisions for backup equipment to process material or a contingency plan to process or divert material if equipment is not available.

Fire Pile Case Study: Yuba-Sutter Disposal Inc., C+D Fire

Name of Facility: Yuba Sutter Disposal, Inc. MRF

SWIS Number: 58-AA-008

Type of Facility: Large Volume Transfer Station and Material Recovery Facility

Location: 3001 North Levee Road, Marysville, CA 95901

Owner and Operator: Yuba Sutter Disposal, Inc. (Norcal)

Date(s) of Fire: Estimated start at 8:30 pm on 06-23-04. Reported to CDF at 8:52 pm. Fire extinguished 6-27-04.

Type of Material Burned: Construction and Demolition Debris including wood, concrete, metal, wiring, roof shingles, and siding dropped off by contractors and general public. Fire was 40 feet south-west of 50,000 square foot transfer facility building.

Size of Fire (area or volume): Two piles burned. One was 100 feet long by 50 feet wide by 20 feet high; the second was 50 feet long by 50 feet wide by 20 feet high.

Fire Department(s): Department of Forestry and Fire Protection aka CDF.

LEA: Yuba County Environmental Health

Other Agencies: Fire Department; Feather River Air Quality Management District

What happened?
A security camera recorded video images of the fire developing in the larger pile. Joseph P. Hernandez, Battalion Chief, CDF reviewed this tape and prepare a fire incident report.
According to tape time code, first wisp of smoke observed from top of pile at 8:30 pm; first flame is visible at 8:43 pm; top of pile is well involved at 8:48 pm. The fire spread quickly due to pre-heating of the pile, stacking of debris for ideal fire spread conditions and delta breezes which fanned the fire. Spontaneous combustion is the listed cause in the CDF report.

What worked? Spreading out the pile to extinguish

What was lacking? More room needed for material; piles too high, too big and too old. Inadequate temperature monitoring of piles.

What fixes have been adopted? Overhead sprinklers added. Fire lanes added.

What recommended changes remain to be adopted? Moving material out within 7 days.

Fire Pile Case Study: Yuba-Sutter Disposal Inc., Compost Fire

Name of Facility: Yuba Sutter Disposal, Inc
SWIS Number: 58-AA-0015AA

Type of Facility: Composting, Registration Tier

Location: Yuba County, Highway 20, Northwest of Marysville
3001 North Levee Road

Owner and Operator: Yuba Sutter Disposal Inc. (Norcal)

Date(s) of Fire: 07/19/04 Start estimated as Noon; Reported to CDF at 7:23 pm. Burned for four days.

Type of Material Burned: Compost feedstock from residential pick-up and contaminants

Size of Fire (area or volume): Pile 100 feet by 50 feet by 20 feet high

Fire Department(s): Department of Forestry and Fire Protection aka CDF

LEA: Yuba County Environmental Health

Other Agencies: Fire Department and Feather River Air Quality Management District

What happened?

According to CDF report, at ~ 12:30 pm operator observed what appeared to be heat emanating from one of three piles. This heat was at the south-east portion of the pile. Facility staff used their water tender and applied about 3,000 gallons of water to the pile. The fire department was not called.

That evening facility staff observed dark smoke in the green waste processing area. Upon investigation, a small spot fire approximately 20 feet by 20 feet was observed on the southeastern area of the sorted wood/organic debris pile. He radioed the shop to call the fire department. CDF reports receiving call at 7:23 pm. When CDF arrived, pile is 25% involved with fire. The southeastern portion of the pile was on fire and it had spread to the grass threatening a gas collection unit located 25 feet laterally from the pile. Exposures were protected, AQMD was notified and the fire allowed to burn. Delta breezes allowed the fire to spread to the rest of the pile. Spontaneous combustion is the presumed cause of this fire.

What worked? Spreading and wetting material to extinguish

What was lacking? Not enough space. Feedstock pile was too big and too old.

What fixes have been adopted? Old feedstock has been partially eliminated.

What recommended changes remain to be adopted? See above. More space. Reduce pile size and age.

Fire Pile Case Study: Yuba-Sutter Disposal Inc., Compost Fire

Name of Facility: Yuba Sutter Disposal, Inc
SWIS Number: 58-AA-0015AA

Type of Facility: Composting, Registration Tier

Location: Yuba County, Highway 20, Northwest of Marysville
3001 North Levee Road

Owner: Yuba Sutter Disposal Inc. (Norcal)

Operator: Yuba Sutter Disposal Inc. (Norcal)

Date(s) of Fire: Reported to CDF on9/25/04
Allowed to burn. Still smoking on 9/28/04.

Type of Material Burned: Composting Feedstock including lawn clippings and yard trimmings
Residential with contaminants.

Size of Fire (area or volume): 6, 000 cubic yards

Fire Department(s): Department of Forestry and Fire Protection aka CDF

LEA: Yuba County Environmental Health

What was lacking?

1) enough space to operate,
2) grinder with enough capacity for waste volumne,
3) employee training in organic material pile managmement

What fixes have been adopted?

1) No feedstock piles over 12 feet high or 30 feet wide.
2) Improved temperature monitoring of piles.

What recommended changes remain to be adopted?

1) Increased setback between piles and landfill gas system and flare
2) Removal of large piles of compost “overs”.

Fire Pile Incident Report

Name of Facility: YSDI Greenwaste Composting

SWIS Number: 58-AA-0015

Type of Facility: Greenwaste Composting

Location: 3001 N. Levee Rd. Marysville

Owner: YSDI/Norcal

Operator: Norcal

Date(s) of Fire: 9/25/04 - 9/28/04)

Type of Material Burned: Mixed grass clippings, tree & shrub trimmings (materials collected curbside in green toters)

Size of Fire (area or volume): Approximately 6000 yd^3

Fire Department(s): Marysville Fire Department

LEA: Stephanie Hamby & Deborah Biersteker

Other Agencies investigating: Feather River Air Quality Control Board is investigating for air quality violations. The fire department considers this a "controlled burn" and will not be accessing fines. There were conflicting statements from the fire department and the air board. The fire department told the operator to let it burn out, while the air board wanted the fire extinguished as soon as possible.

What happened: Pile size, age, type of material, agitation of pile, and weather conditions were all contributing factors to the spontaneous combustion of the greenwaste feedstock pile. The pile was approximately 2 months old due to space constraints from construction of the pad and road repairs. The grinder had numerous breakdowns. YSDI stated they were looking into obtaining a larger grinder to get caught up. A couple of days prior to the fire, YSDI resumed grinding, which probably agitated the pile and increased oxygen. Temperatures taken by facility personnel were recorded as an average of 4 temperatures per pile. The average temperatures in the days leading up to the fire were 160°F to 165°F. It was breezy and warm the day before the fire started. The fire was extinguished by wetting and separating the material until the core was reached.

(Continued on Page 2)

Summarize other Agency involvement? Feather River Air Quality Management District plans to access fines. The Marysville Fire Department responded to a small grass fire adjacent to the facility. YSDI/Norcal was responsible for controlling and extinguishing the compost fire. The Marysville Fire Department has not submitted a report to date.

What worked? This is the second fire in the greenwaste feedstock pile in two months. The size of the pile after the first fire was much smaller during the August inspection. However due to space constraints and equipment failure (grinder) the pile size expanded significantly. It seems that the smaller piles reduce the chances for fire.

What was lacking? Space and an adequate grinder were major factors. YSDI monitors the temperatures, but lacks procedures for defining and reducing risk factors associated with spontaneous combustion.

What fixes have been adopted? YSDI/Norcal plans to windrow feedstock into 200ft long, 10ft-12ft. high, and 30ft. wide windrows prior to grinding. Feedstock windrows will be wetted twice daily and turned weekly for approximately 6 weeks and then ground/screened. Construction and repairs to the road and pad are nearly complete. Space constraints should not be a problem at this time, due to the completed expansion.

What recommended changes remain to be adopted? I feel a larger grinder would be beneficial. Better planning for future growth should be considered. Written procedures for documenting conditions associated with spontaneous combustion and corrective actions required/taken should be established. Employees need additional training in compost management and fire prevention.

Prepared by: Stephanie Hamby, LEA
Date: September 29 - October 13, 2004

3.0

Combustion Processes in Pile Fires

Plant material burns intentionally and unintentionally. Dr. Harold Biswell, Professor of Forestry at UC Berkeley, wrote about the role of fire in the evolution of ecosystems and plant communities. He urged that fire be re-introduced into land management practices as part of the forces of nature. His critics called him "Harry the Torch". Nevertheless, controlled burning of forests and wild lands is becoming accepted as a valuable management tool if the fires can be controlled and the adverse impacts, including the smoke are mitigated.

The chemistry and physics of fire are discussed in an extensive review article entitled Heat Generating Processes as Cause of Spontaneous Ignition in Forest Products by Professor Hans Kubler and published in Forest Products Abstracts, 1987, Volume 10, Number 11. Robert Rynk published an article entitled Fires at Composting Facilities: Causes and Conditions in BioCycle, Volume 41, Number 1, January 2000.

While each article focuses on specific types of plant tissue (i.e. forest products and compost), the insights and conclusions are applicable to all pile fires.

Kubler wrote:

> "It is well known that wood and bark generate plenty of heat when burning. It is not so well known that these forest products, as well as leaves of felled trees, slowly release energy from within at temperatures far less than that of combustion. The heat released drives the temperature of the material up without input of heat from external sources, it causes *self-heating*. We know self-heating from manure, grass clippings, hay, silage and other large piles of plant tissues."
>
> "At times self-heating leads to smouldering combustion and even to conflagration. We speak then of *spontaneous combustion*, which characteristically starts without external ignition. Piles of forest products self-heat approximately as fast as piles of coal of the same size, and may ignite within several months. Discarded oil-paint rags, the best known example of spontaneous combustion, self-heat much more quickly; they start glowing and burst into flames within a few days."

The wood in a pile of Construction and Demolition material is processed lumber that can undergo self-heating. The lawn clippings and tree branches in a pile of compost feedstock can also undergo self-heating. The windrow of "cooking" compost uses the heat from the chemical reactions and the biological decomposition to make the "finished compost". If the self-heating in piles is not reduced by heat loss to the ambient environment or other factors, then the heat buildup can be enough to cause a fire.

In August 2004, an all LEA email was sent to encourage interested parties to look out for problematic fire conditions. The key points are quoted below:

"Fire prevention is key! Quoting from Rynk (2000): "Key conditions that lead to spontaneous combustion are biological activity, relatively dry materials or dry pockets, large well-insulated piles or vessels, limited air flow, and time for temperature to build up. In addition, there may be other contributing factors such as short circuiting of air flow, a non-uniform mix of materials, poor moisture distribution, difficulty in knowing temperatures throughout a pile, and sometimes a lapse or oversight in monitoring. These key conditions are usually more prevalent within large undisturbed piles containing raw feedstocks, curing compost and finished compost than in the active composting system." Temperature monitoring and compostable materials management to address "wet/dry interface" concerns are two of the most important aspects of fire prevention for most operators. Temperature monitoring can pose problems, though, as it is difficult to "know" temperatures throughout the pile unless the pile is very small and/or highly homogeneous. Beyond temperature monitoring, it is difficult "know" the pile's composition, level of aeration, and moisture content. Since biological decay produces hydrocarbons and other intermediates that may ignite and/or burn at lower temperatures, fires may start deep within the pile and be difficult to detect.

Rules of thumb:

Δ More homogeneous, freshly-ground material is less likely to combust. For instance, a well-ground, uniformly wet, 20-foot-high pile that peaked at 195 plus degrees Fahrenheit just after grinding, and trailed off in a two week period to a very stable mid-140's degrees Fahrenheit, did not combust. Conversely, a marginally ground pile of mixed grass and wood waste when pushed together by an operator climbed in temperature overnight and caught fire.

Δ Pile size dictates heat retention. When some very old, relatively hard-packed material in large piles had pile heights reduced to 6 feet or less, internal temperatures were directly lowered to less than 20 degrees above ambient. A pile over 12 feet high with sub-surface temperatures above 160 degrees Fahrenheit would in most cases be cause for extreme alarm (see below).

Δ Wet/dry interface starts most compostable materials fires -- in other words, a pile that has dry spots which come in contact with a portion of the pile that is wet and composting robustly has a good chance of catching on fire. The robustly composting material reaches temperatures that support chemical oxidation, and the fuel from the dry portion continues the chemical oxidation and eventually combusts. Combustion occurs between 205 to 400 degrees Fahrenheit. Two possible scenarios illustrate this: 1) some very old, dry material comes in contact with new wet, unground material after a late rain, and a hot north wind blows at the end of a long, hot day to start a fire; 2) in late summer, after several unusually hot days in a row, some dust suppression water gets on the edge of a drying pile, the wet area heats up and starts a fire -- the water encourages vigorous biological activity, raises the temperature, and the dry portion of the pile ignites. Quoting again from Rynk (2000), "Moisture is a crucial requirement for composting and spontaneous combustion. In both cases, proper moisture is a matter of balance. The critical moisture range that supports spontaneous combustion is roughly 20 to 45 percent. Above 45

percent, there is enough moisture available for evaporation to hold down temperatures. Below 20 percent, there isn't enough moisture to sustain the biological activity that initiates the temperature rise."

Δ There are other sources of ignition to keep in mind. Equipment sparks and off-site fires are common sources of ignition. The location of piles of combustable compostable materials needs to be critically observed. Could the piles ignite because of nearby grass fires? Are the piles near structures, equipment or other components that could also catch fire? Can all sides of the pile be accessed in case fire suppression is needed?" (The full text of this e-mail can be found in the appendices.)

4.0 Roles of Governmental Agencies

Firefighters

In California, the lead agency for fire protection is either a local fire department such as the Alameda County Fire Department which responded to the fire at the Davis Street Transfer Station in San Leandro or the California Department of Forestry and Fire Protection (http://www.fire.ca.gov/php/) which responded to the fires at Yuba-Sutter Disposal Inc. near Marysville.

Historically know as the Department of Forestry and still called "CDF", the state has primary responsibility for many areas of the state. Under mutual aid agreements, local fire districts and CDF will respond to fires outside their home jurisdiction, or provide station coverage for other fire crews who have left their station to fight a fire. Special Districts may be created to raise tax revenues to fund fire fighting services in areas without an established fire department. For example, in the rural portion of Yolo County south of El Macero, the Board of Supervisors created the "No Man's Land Fire District" which contracts with the Cities of Davis and Dixon to provide fire protection services in this area.

Part of the facility planning for any solid waste site should include the identification of the lead agency responsible for fire fighting at that property as well as its response time, equipment availability and capabilities of the mutual aid fire departments who may serve as backup.

Fire Codes

In California, an official Fire Code is adopted in regulations at the state level as part of a process for building standards that also included adoption of uniform plumbing and electrical codes. These uniform codes are developed by various non-governmental associations and are usually copyrighted. Therefore, the provisions of these codes are not posted on the Internet and are not as readily available as non-copyrighted regulations. These fire regulations serve as minimum standards. Each local jurisdiction may adopt more stringent standards. Appendix XX provides key excerpts from the Fires Codes which have been quoted with the permission of the copyright holder. Unfortunately, the existing uniform fires code provisions do not focus on solid waste facilities as this industry now exists. The provisions for waste and recycling facilities can be considered

directives to "do good and avoid evil". They mention the need for an adequate water supply for fire protection, but do not list specifics for number of water hydrants on site, minimum water pressure and volume. They mention the need for adequate fire lanes, but so not specify minimum width of fire lanes and maximum distance between the fire lanes. The mention the need to minimize pile height, but do not specify a maximum height for the various types of solid waste piles. The standards for large lumber yards in rural areas are too permissive when applied to solid waste facilities in suburban or urban areas.

Fire Marshals

Within the Department of Forestry and Fire Protection, there exists the Office of the State Fire Marshall (http://osfm.fire.ca.gov/) that focus on fire prevention. Many of the local fire departments also have staff who spend time reviewing plans, inspecting sites, enforcing applicable code provisions and educating the citizenry on fire prevention. Due to budget constraints, the state and local fire marshals have needed to prioritize. Fires in structures (large businesses, schools, hospitals and homes) and wild land and forest fires have historically demand more attention than piles of solid waste.

Local Governmental Conditional Use Permit (CUP)

As a part of the planning process in California, most cities and counties can require a CUP for various activities including solid waste facilities. Each jurisdiction can define what type or size of project is subject to or exempted from the CUP requirement. A small composting bin in a homeowner's backyard may be exempted, while a commercial composting operation designed to process 1,000 tons of yard clippings per year may require a CUP with site specific requirements. These conditions can be monitored by code enforcement.

California Environmental Quality Act (CEQA)

When a CUP is needed, the local lead agency is often required to assess the adverse environmental impacts of a project and consider mitigation measures. (Other local and state agencies may also need to comply with the CEQA requirements.) During the preparation of the Initial Study, Negative Declaration, Environmental Impact Report or other required CEQA documents, there is an opportunity to consider the potential for fires, the adverse impacts of the fires, and incorporate mitigation measures which would reduce the likelihood of fire and minimize the adverse impacts of those fires which do occur.

Cal/EPA

Within the California Environmental Protection Agency, are several Boards and Departments which have a responsibility to consider the impacts of pile fires.

CIWMB/Local Enforcement Agencies (LEAs)

The Permitting and Enforcement Division is charged with implementing state law and regulations for permitting the various types of solid waste facilities and inspecting these

facilities to insure compliance. At the local level, designated LEAs (frequently County Environmental Health Departments) implement the permitting and enforcement requirements. Violations can be issued to operators who do not follow the applicable regulations and thereby cause or allow pile fires to occur. Since the laws and regulations have developed over time, the requirements for fire prevention vary with the type of solid waste facility. Appendix XX summarizes the relevant violations which can be issued for pile fires. The recently adopted CDI Fire Plan requirements are an example of new solid waste regulations which now apply to CDI facilities and may be expanded to apply to other solid waste facilities. See Title 27, Division 2, Subdivision 1, Chapter 4, Subschapter 3, Article 1, Section 21565 et seq.

ARB/AQMD

The Air Resources Board and the local Air Districts (http://www.arb.ca.gov/drdb/drdbltxt.htm) implement laws and regulations to promote air quality and regulate the emission of pollutants to the air. Since fires cause smoke, odors and other air pollution, an Air District may regulate emission for a solid waste facility by permit conditions or other means. The Air Districts often consult with the Fire Departments to promote fire fighting methods which minimize air pollution. A hot fire burns cleaner and letting it burn may produce less air pollution than attempting to extinguish the fire with water.

SWRCB/RWQCB

The State and Regional Boards implement laws and regulations to promote water quality, prevent water pollution and protect the beneficial uses of the waters of the state. When fires are extinguished with water, the resultant wastewater can pollute surface water or enter a water treatment plant and cause problems.

Add AG/DA/CA for general business violations

5.0 Barriers and Gaps

The current Fire Codes do not specifically discuss the new types of waste management and solid waste recycling operations that currently exist. The Fire Code does not individually mention composting operations, but does have combined section for lumberyards, hogged materials (Number) and another for Refuse Businesses (Number). These sections provide “do good and avoid evil” language that lacks specific prescriptive practices and procedures for operators to follow and fire departments to use in their site inspections of solid waste facilities. They often mention the need for fire lanes but does not specify the width and frequency. They mention the need for adequate water supply but does not specify minimum volume, minimum pressure or minimum distance to hydrants. Maximum pile height is not specified or is based upon a rural area. It's difficult to develop specific fire plans (as in the CDI requirements) for solid waste facilities in suburban or urban areas without more specifics, as well as difficult for local fire districts to review/comment on any such plans. The fire code provisions which were developed for lumber mills in rural areas are not appropriate for suburban or urban solid waste facilities.

Fire Departments are busy responding to the more frequent fires in business structures, homes and wildland fires in the Rural/Urban Interface. Training firefighters in the subtleties of compost, C+D and other solid waste fire management techniques is a low priority or non-existent. For example, adding water to burning wood chips or composting material initially controls the fire but then the water can actually encourage chemical oxidation reactions which trigger another fire several hours after it was presumably "put out" and the fire responders have left the site. The Fire Codes do not specify this unique aspect of pile fires nor do they provide directions to operators or firefighters to monitor these piles for fire recurrence.

Fire Investigators are challenged to conclusively determine the cause of a solid waste pile fire since there usually are not any witnesses and the fire control efforts often obscure any evidence. While intentional or unintentional arson, lightning, and sparks from equipment or power lines are all possible causes, "spontaneous combustion" is usually listed as the presumptive cause.

Another barrier is one of perception. Historically, "spontaneous combustion" has been viewed by many as a natural occurrence that is to be accepted as a routine and unavoidable event. A new fire prevention ethic is needed which teaches that "spontaneous flaming" is predictable and preventable by managing the prolonged pile heating which can eventually produce fire.

"Spontaneous combustion" in human endeavors is really "extended mismanagement" since the conditions which are needed to produce a fire are allowed to exist over a prolonged time period before "spontaneous flaming". In "cooking compost", the heat needed to make compost is allowed to get out of control and be the trigger of a fire.

Another barrier is the belief that fire prevention is the exclusive role of the fire department and not a prime responsibility of operators and other regulators.

6.0 Discuss Options to Prevent Fires

(Suggestions are welcome)
Fire Prevention Plans
Best Management Practices
Permit Conditions (See Sonoma County Example)
Fire Lanes
On-site Fire Resources (Heavy Equipment)
    Discuss Vasco Road example
Temp Monitoring
Water Supply
No Smoking
Site Security
Pile Height

7.0 Appendices will be added.

Appendix ___ Sample Permit Condition Language from Sonoma County

As a result of the discussions at the Sacramento Round Table on 9/28/04 we learned that the Sonoma County LEA has used a permit condition to address the issue of fire hazards in piles of C and D Debris at the Central Disposal Site (SWIS Number 49-AA-001).

On October 4, 2004, Bob Swift (Sonoma LEA) and I discussed this matter. He conferred with the local fire marshal and they discussed the potential applicability of Section 3008 Uniform Fire Code. Since the section title is "Storage and Processing of Wood Chip, Hogged Material, Fines, Compost and Raw Product in Association with Yard Waste and Recycling Facilities", it was not certain that it actually applies to C+D activities at a landfill and the fire department could enforce it. In addition, it was decided to require more specific and more restrictive pile size limitations than specified in Section 3008, Uniform Fire Code by adding condition language in the Solid Waste Facilities Permit.

Permit Condition 17aa is in effect and now states:

The Construction and Demolition Debris Diversion Program is subject to the following limitations

1. A 20 foot setback is required between the grinder and all sound walls and all processed and unprocessed material stockpiles.
2. The stockpiles of processed and unprocessed materials are limited to 2,500 cubic yards (100 ft x 45 ft x 15 feet).
3. A 12 foot wide firelane shall be provided between stockpiles to allow access to all operation areas.
4. All Construction and Demolition and Inert Debris shall be processed within 15 days of receipt and the processed material shall be removed from the site within 15 days of processing.
5. Daily cleaning of the operations area around the grinder and stockpile areas is required.

For comparison, Section 3008 UFC limits piles to:
250 ft x 150 ft x 25 feet. (3,422 cubic yards)

Solid Waste Permit Condition, 17aa limits piles to:
100 ft x 45 ft x 15 feet. (2,500 cubic yards)

This is an example of using a "permit condition" to clearly make the specified fire prevention practices within the jurisdiction of the LEA. We have photos of the straw bale sound walls and tub grinder. The 20 foot setback from the tub grinder was selected to provide a margin of safety, since this equipment experienced a small fire on July 22, 2003. Reducing the pile volume and requiring fire lanes are other fire mitigation measures that the LEA can now enforce along with the more traditional processing time limits. Using permit conditions is an option for "full" permits. Options for other tiers still need to be considered.